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Docket No. 2001-020-TAP

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: **Dee et al.**

Serial No. **09/896,162**

Filed: **June 29, 2001**

For: **Apparatus and Method of Making a Reduced Sensitivity Spin Valve Sensor Apparatus in which a Flux Carrying Capacity is Increased**

Group Art Unit: **2653**

Examiner: **Castro, Angel A.**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

ATTENTION: Board of Patent Appeals and Interferences

Certificate of Mailing Under 37 C.F.R. § 1.8(a)
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By: Carrie Parker
Carrie Parker

APPELLANT'S BRIEF (37 C.F.R. 1.192)

This brief is in furtherance of the Notice of Appeal, filed in this case on January 20, 2004.

The fees required under § 1.17(c), and any required petition for extension of time for filing this brief and fees therefore, are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This brief is transmitted in triplicate. (37 C.F.R. 1.192(a))

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REAL PARTIES IN INTEREST

The real party in interest in this appeal is the following party: Storage Technology Corporation.

RELATED APPEALS AND INTERFERENCES

With respect to other appeals or interference's that will directly affect, or be directly affected by, or have a bearing on the Board's decision in the pending appeal, there are no such appeals or interference's.

STATUS OF CLAIMS

A. TOTAL NUMBER OF CLAIMS IN APPLICATION

Claims in the application are: 5-7, 9, 10, 15-17, and 19-21.

B. STATUS OF ALL THE CLAIMS IN APPLICATION

1. Claims canceled: 1-4, 8, 11-14, 18.
2. Claims withdrawn from consideration but not canceled: None.
3. Claims pending: 5-7, 9, 10, 15-17, and 19-21.
4. Claims allowed: None.
5. Claims rejected: 5-7, 9, 10, 15-17, and 19-21.

C. CLAIMS ON APPEAL

The claims on appeal are: 5-7, 9, 10, 15-17, and 19-21.

STATUS OF AMENDMENTS

No amendments were made in response to the final Office action.

SUMMARY OF INVENTION

The present invention provides a reduced sensitivity spin valve head for magnetic tape applications. (Page 6, lines 5-6.) The present invention compromises a portion of the large output gain derived from using state of the art spin valve sensors in order to reduce the flux capture and thus, the signal distortion in the spin valve sensor. Page 6, lines 6-10.) In order to provide a

reduced sensitivity spin valve sensor, one or more of the basic sensitivity of the spin valve, the flux carrying capability of a free layer, and a flux injection efficiency of the spin valve head structure are modified to reduce the flux capture by the sensing layer. (Page 6, lines 10-15.)

ISSUES

I. Whether claims 5-7, 10, 15-17, and 20 are properly rejected under 35 USC 102(e) as anticipated by Gill (USPN 6,590,749); and

II. Whether claims 9, 19, and 21 are properly rejected under 35 USC 103(a) as unpatentable over Gill in view of Murayama et al. (USPN 6,392,849).

GROUPING OF CLAIMS

For the reasons described below, the claims are broken into the following groups:

Claims 5-7, 10, 15-17, and 20 are Group A.

Claims 9, 19, and 21 are Group B.

ARGUMENT

I. 35 U.S.C. § 102, Anticipation (Group A)

The examiner has rejected claims 5-7, 10, 15-17, 20 under 35 U.S.C. § 102 as being anticipated by Gill. This rejection is respectfully traversed.

In rejecting the claims, the Examiner states:

> Regarding claims 5 and 15, Gill discloses a reduced spin valve sensor apparatus (figure 12) comprising:
>
> at least one magnetically fixed layer 222; and
>
> at least two free layers 240, 242, 244;
>
> wherein the at least one magnetically fixed layer includes at least two magnetically fixed layers 222, 216, and wherein the at least two free layers are positioned between the at least two fixed layers 222, 216, and wherein the at least two free layers are positioned between the at least two fixed layers; and
>
> wherein the at least two magnetically fixed layers have a parallel magnetic orientation (see orientation 228, 234).

Analysis

Claim 5 is reproduced for reference:

5. (Previously Presented) A reduced sensitivity spin valve sensor apparatus, comprising:

at least one magnetically fixed layer; and

at least two free layers;

wherein the at least one magnetically fixed layer includes at least two magnetically fixed layers, and wherein the at least two free layers are positioned between the at least two fixed layers; and

wherein the at least two magnetically fixed layers have a parallel magnetic orientation.

Claim 5 claims "A reduced sensitivity spin valve sensor...." The apparatus of Gill, as cited by Examiner, teaches instead a sensor with an increased magnetoresistive coefficient, or an increased sensitivity sensor. Further, though the Examiner has found particular elements of the present invention in cited references, the Examiner has not shown the elements of the present invention arranged as they are in the present claims to produce the claimed invention, namely, "A reduced sensitivity spin valve sensor...."

Gill states at col. 2, lines 54-62:

> A dual spin valve sensor may be employed for increasing the magnetoresistive coefficient dr/R of a read head. In a dual spin valve sensor first and second pinned layer structures are employed with a first spacer layer between the first pinned layer structure and the free layer and a second spacer layer located between the second pinned structure and the free layer. With this arrangement the spin valve effect is additive on each side of the free layer to increase the magnetoresistive coefficient dr/R of the read head.

Hence, Gill is not directed to a reduced spin valve sensor, as claimed in the present invention.

Further, Examiner selects specific elements of Gill without considering the remaining

elements of Gill, which render the invention of Gill very different from the invention of the present claims. For example, though Gill describes fixed magnetic layers 222 (part of larger AP pinned layer structure 210) and 216 (part of larger AP pinned layer structure 208) as cited by Examiner, which are parallel to one another, the Examiner fails to note the remaining parts of AP pinned layer structures 208 and 210. Namely, AP pinned layer structures 208 and 210 each include not only parallel fixed magnetic layers 216 and 222 respectively, but they also include antiparallel fixed layers 214 and 220, respectively. Hence, the name, "AP pinned layer structures..." used in Gill. The AP stands for "anti-parallel," as in anti-parallel magnetization directions. As shown in FIG. 12 of Gill, AP structures 208 and 210 each include not only layers 216 and 222 (cited by Examiner), but also layers 214 and 220--which are anti-parallel to both layers 216 and 220.

Further, Gill's "two free layers" as cited by Examiner are in fact part of a single free layer structure 202, which comprises three separate films that are stacked together to act as a single free layer. No spacers are shown in Gill in structure 202. It is therefore respectfully submitted that Gill does not teach multiple free layers, but a single free layer structure comprised of multiple parts. For example, Gill characterizes free layer structure 202 as "a free layer," at col. 6, lines 24-26:

> In this embodiment, a free layer 202 is located between nonmagnetic conductive first and second spacer layers 204, 206.

Gill also describes this structure at col. 6, lines 55-58:

> The free layer 202 may include a nickel iron film 240 which is located bwteeen first and second cobalt iron films 242, 244.

Hence, it is respectfully submitted that Gill does not in fact teach two separate free layers, but instead teaches a single free layer that comprises multiple films, and those films are used to increase sensitivity, not decrease it, as presently claimed:

It has been found that the cobalt iron films 242, 244 between the nickel iron film 240 and the copper spacer layers 204, 206 increase the magnetoresistive coefficient dr/R.

[Col. 6, lines58-61.]

The inquiry is not whether each element existed in the prior art, but whether the invention as a whole is obvious in light of the prior art. *Hartness International, Inc. v. Simplimatic Engineering Co.*, 819 F.2d 100, 2 U.S.P.Q.2d 1826 (Fed. Cir. 1987). "It is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." *In re Hedges*, 228 U.S.P.Q. 685, 687 (Fed. Cir. 1986).

In the present case, Applicant respectfully submits that Examiner has selected only those elements from Gill which comport with elements of the present invention, and has ignored other elements of Gill which would teach one of ordinary skill in the art away from the present invention. Namely, Gill teaches an increased sensitivity spin valve sensor, while the present invention teaches a reduced spin valve sensor, as argued above and as indicated by the elements of first and second AP pinned layer structures 208, 210, as argued above. Therefore, it is respectfully submitted that claim 5 is distinguished from the cited reference.

Claim 10 is also believed allowable over the cited references, and is reproduced below:

10. (Original) The reduced sensitivity spin valve sensor apparatus of claim 5, wherein a magnetic flux is distributed across the two free layers to thereby reduce a magnetic flux fed to each free layer.

[Emphasis added.]

Claim 10 claims that the magnetic flux is reduced for each free layer. Examiner states in the rejection that, "...it is evident from the reference to Gill that the magnetic flux is distributed across the at least two free layers to thereby reduce a magnetic flux fed to each free layer." Though Gill does show generally magnetic flux across a free layer structure 202, Gill does not

appear to teach or suggest that this magnetic flux is distributed across two free layers "to thereby reduce a magnetic flux fed to each free layer," as claimed. Therefore, claim 10 is believed distinguished from the cited reference.

For the above reasons, or for their dependence on allowable claims, all of claims 5-7, 10, 15-17, and 20 are believed distinguished from the cited references. Favorable reconsideration of the claims is respectfully requested.

II. 35 U.S.C. § 103, Obviousness (Group B)

The examiner has rejected claims 9, 19, and 21under 35 U.S.C. § 103 as being unpatentable over Gill in view of Maruyama. This rejection is respectfully traversed.

In rejecting the claims, the Examiner states:

> Maruyama et al discloses a read head (figure 9) where the two free layers 42, 47 are separated by a non-magnetic layer 46. It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide spin valve sensor of Gill with the free layer structure as taught by Maruyama et al. The rationale is as follows: one of ordinary skill in the art would have been motivated to provide the spin valve sensor of Gill with the free layer structure as taught by Maruyama et al as doing this the sensor would measure the field intensity simultaneously, and the difference in the field intensity would be detected as an output difference to measure a field gradient.

Examiner's justification for this combination, that providing a non-magnetic spacer in the free layer structure of Gill, "as doing this the sensor would measure the field intensity simultaneously..." However, there is no suggestion in either cited reference, nor in the present application itself for measuring separate magnetic field gradients between two separate free layers. In the present invention, the spacer is provided to allow the magnetic field to be divided between the two separate free layers, in order to reduce sensitivity. This function or application is neither taught nor suggested in either reference. Hence, it is respectfully submitted that the combination presented by Examiner is improper. The present application describes the use of two separated free layers at page 22, lines 21-24:

By providing two free layers, the present invention allows the magnetic flux to be spread across the two free layers thereby reducing the magnetic flux fed to each free layer in half.

[Emphasis added.]

Hence, the present application is believed distinguished from the cited references, and favorable reconsideration of the claims is respectfully requested.

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APPENDIX OF CLAIMS

The text of the claims involved in the appeal are:

1-4. (Cancelled)

5. (Previously Presented) A reduced sensitivity spin valve sensor apparatus, comprising:

at least one magnetically fixed layer; and

at least two free layers;

wherein the at least one magnetically fixed layer includes at least two magnetically fixed layers, and wherein the at least two free layers are positioned between the at least two fixed layers; and

wherein the at least two magnetically fixed layers have a parallel magnetic orientation.

6. (Original) The reduced sensitivity spin valve sensor apparatus of claim 5, further comprising at least one non-magnetic spacer positioned between the at least one fixed layer and one of the at least two free layers.

7. (Original) The reduced sensitivity spin valve sensor apparatus of claim 5, wherein the at least one fixed layer includes at least two fixed layers having a magnetic orientation approximately 90 degrees from a magnetic orientation of the at least two free layers.

8. (Cancelled)

9. (Previously Presented) The reduced sensitivity spin valve sensor apparatus of claim 5 wherein the at least two fixed layers and the at least two free layers are spaced from one another by three non-magnetic spacers.

10. (Original) The reduced sensitivity spin valve sensor apparatus of claim 5, wherein a magnetic flux is distributed across the two free layers to thereby reduce a magnetic flux fed to each free layer.

11-14. (Cancelled)

15. (Previously Presented) A method of making a reduced sensitivity spin valve sensor apparatus, comprising:

providing at least one magnetically fixed layer; and

providing at least two free layers

wherein providing the at least one fixed layer includes providing at least two fixed layers, and wherein providing the at least two free layers includes positioning the at least two free layers between the at least two fixed layers; and

wherein the at least two fixed layers have a parallel magnetic orientation.

16. (Original) The method of making a reduced sensitivity spin valve sensor apparatus of claim 15, further comprising providing at least one non-magnetic spacer positioned between the at least one fixed layer and one of the at least two free layers.

17. (Original) The method of making a reduced sensitivity spin valve sensor apparatus of claim 15, wherein providing the at least one fixed layer includes providing at least two fixed layers having a magnetic orientation approximately 90 degrees from a magnetic orientation of the at least two free layers.

18. (Cancelled)

19. (Previously Presented) The method of making a reduced sensitivity spin valve sensor apparatus of claim 15, wherein providing the at least two fixed layers and providing the at least two free layers includes spacing the at least two fixed layers and at least two free layers from one another by three non-magnetic spacers.

20. (Original) The method of making a reduced sensitivity spin valve sensor apparatus of claim 15, wherein a magnetic flux is distributed across the two free layers to thereby reduce a magnetic flux fed to each free layer.

21. (Previously Presented) A reduced sensitivity spin valve sensor apparatus, comprising:

first, second, third, and fourth ferromagnetic material layers being separated respectively from one another by three non-magnetic spacer layers, the first and fourth ferromagnetic material layers being outermost ferromagnetic material layers with respect to the second and third ferromagnetic material layers;

wherein the first and fourth ferromagnetic material layers have parallel fixed magnetization direction;

wherein the second and third ferromagnetic material layers have magnetization directions that can rotate when under applied magnetic fields;

wherein magnetic flux is spread across at least the second and third ferromagnetic material layers to thereby reduce the magnetic flux fed to the second and third ferromagnetic layers.